



CALIFORNIA ACADEMY OF SCIENCES
ANNUAL REPORT 1971-72



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A MESSAGE FROM THE CHAIRMAN

THE California Academy of Sciences' home in Golden Gate Park has been developed unit by unit since the opening of North American Hall in 1916. Steinhart Aquarium was added in 1923, then Simson African Hall in 1931, followed by the Science Museum, Morrison Planetarium, Mailliard Library, and finally Cowell Hall in 1969. It was an orderly development under a master plan which resulted in San Francisco's most popular cultural attraction and one of the great natural history museums of the nation. Now we look forward to the completion of the master plan with the improvement of rear service and parking areas, an entrance from Middle Drive, additional aquarium display facilities, and a Hall of Anthropology.

A splendid development for the Academy is a unique and fascinating addition to Steinhart Aquarium, a great new circular tank 62 feet in diameter with a central viewing area from which visitors will enjoy a diver's-eye-view of fast-

CALIFORNIA ACADEMY OF SCIENCES

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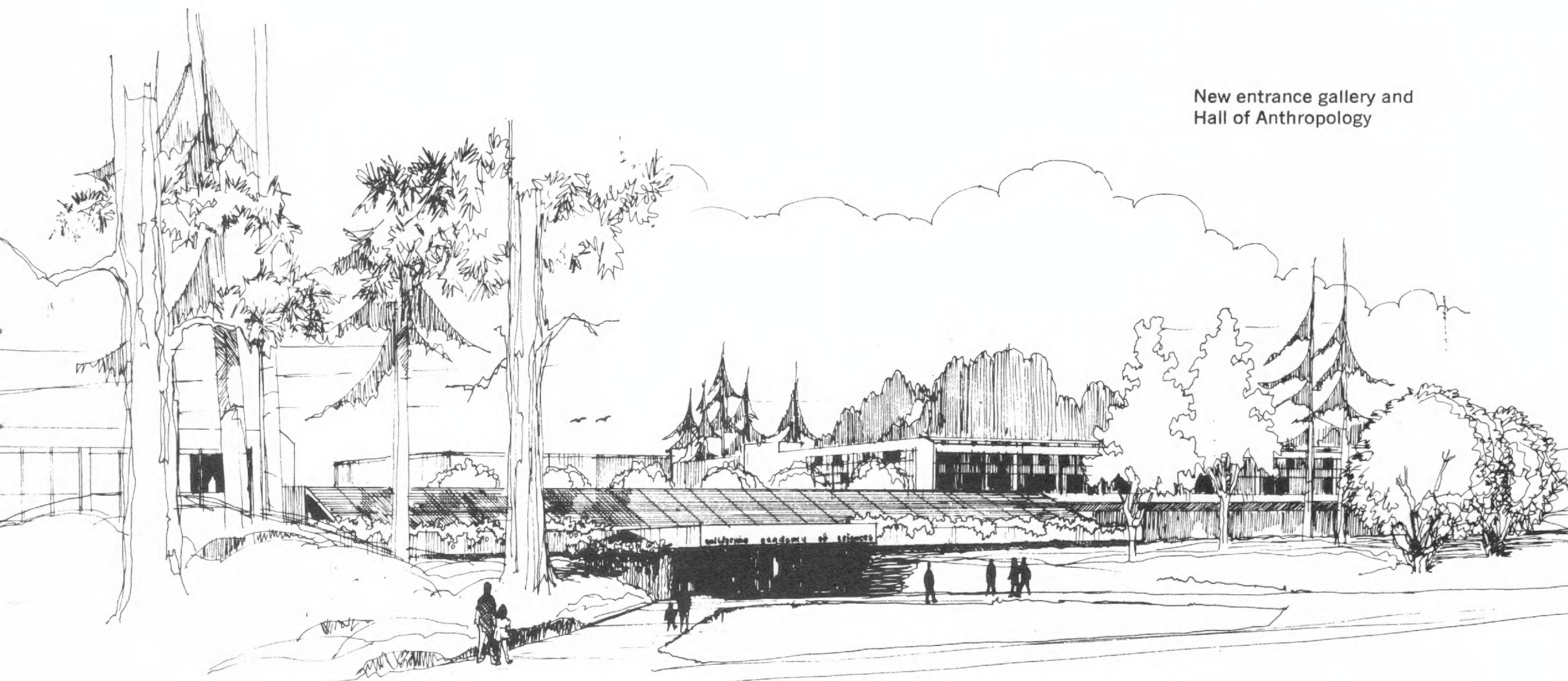
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New entrance gallery and
Hall of Anthropology



moving schooling fishes. This wonderful feature is being made possible through Trustee Wilson Meyer, who is President of the Marie Luise Graham Foundation, which has made available a \$600,000 grant for the "G. H. C. Meyer Fish Roundabout" for Steinhart Aquarium.

The Trustees have long recognized that the Academy could greatly increase its educational role by the addition of an anthropology museum. During the past year they started to raise the funds for that facility. The new museum will tell the story of man, where he came from, his diversities and similarities, and his culture and behavior. It will be a tremendous educational asset for hundreds of thousands of students who visit the Academy in class groups every year and will fill the greatest present need of interpretive programs of the Academy.

The Hall of Anthropology will be built over an area now used for a storage shed and employee parking. It will beautify the rear of the Academy buildings and provide a major entrance from Middle Drive. It will benefit all departments of the Academy. There are seven research departments which house enormous scientific collections which qualify the Academy as one of the most important systematic research assets of the nation. All of the research departments need more space. Two of them, Entomology and Botany, will occupy the two upper floors of the new building, and their present areas will be released for the expansion of other research departments and the Junior Academy which needs more room to accommodate its growing membership.

The new building will cost approximately \$3 million, and the Trustees have agreed that we must raise an additional endowment of \$1½ million to provide the income necessary to maintain the new exhibits and to keep pace with the rising costs of the overall research activities of the

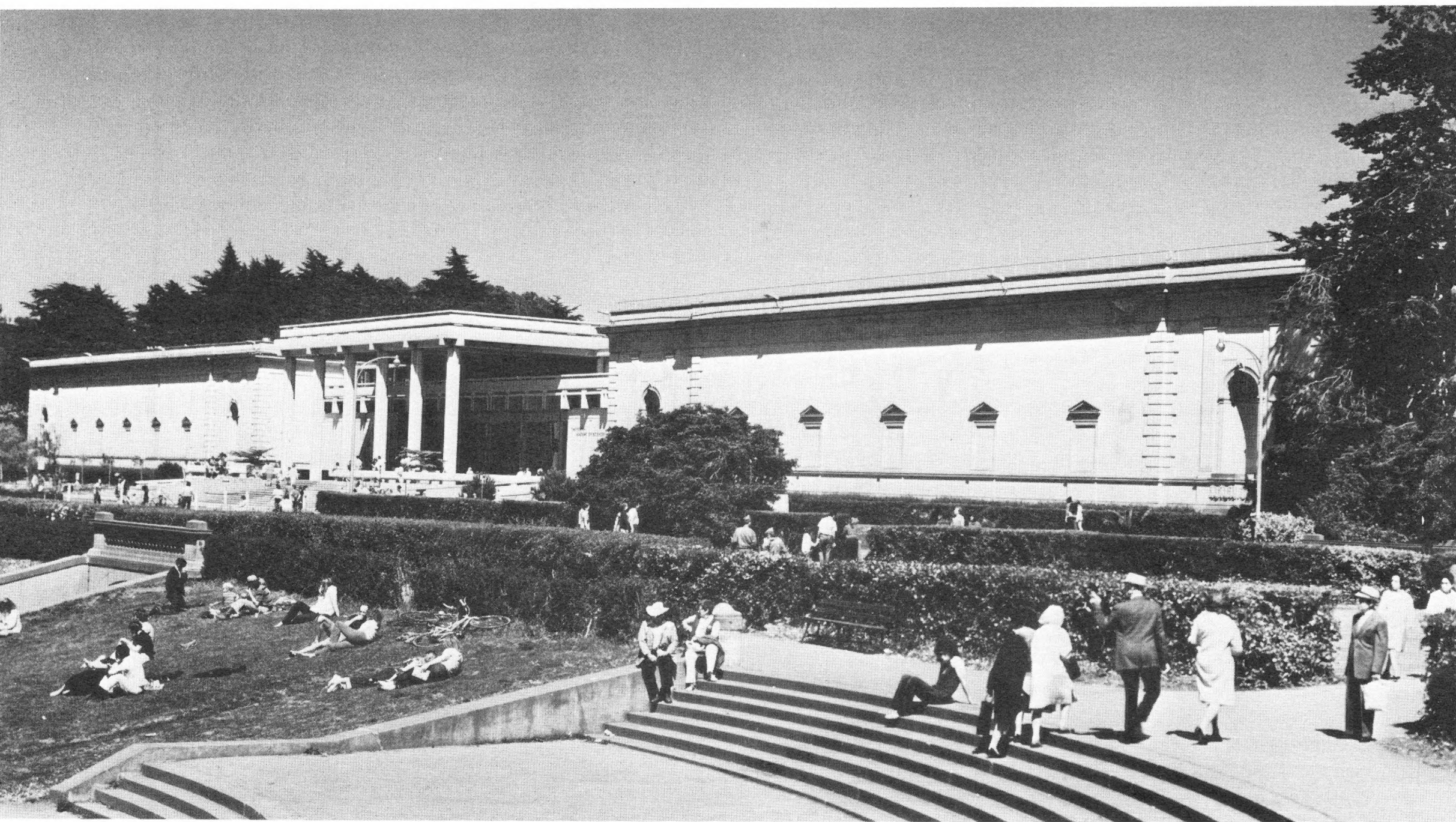
Academy. The Board was encouraged to go ahead with the plan by a most generous gift of \$1 million from the Paul L. and Phyllis Wattis Foundation, and we have received other gifts and bequests which provide a total in excess of \$2 million toward our \$4.5 million goal. In our money-raising efforts we are seeking three \$500,000 gifts to endow distinguished curatorial chairs, one of which has been pledged, and we are soliciting gifts for the Botany and Entomology Department floors which will cost about \$500,000 each. We are well started and are confident that our goal will be achieved.

During the year we welcomed to the Board of Trustees Geraldine Kendrick Morris and Richard H. Jahns. Mrs. Morris was the organizer of the very successful docent program for the Academy and has been an effective and tireless worker in building that program. Dr. Jahns is Professor of Geology and Dean of the School of Earth Sciences at Stanford University, President of the Geological Society of America and a Fellow, officer and member of twenty learned and professional organizations.

We have had another year of splendid community support, in addition to the gifts and pledges I have mentioned. We are grateful to the individuals, foundations, corporations and members of the business community who have provided their generous financial help and thus made possible the activities which are reviewed in the Director's report which follows.

E. Morris Cox

E. MORRIS COX
Chairman, Board of Trustees



REPORT OF THE DIRECTOR

The California Academy of Sciences is the oldest scientific organization in the western United States, having been established in 1853. It is a distinguished research institution recognized internationally for the quality of its staff and its scientific collections, and it operates a public museum, planetarium and aquarium complex which is the most popular cultural attraction in the area. The general purpose of the Academy is the exploration and interpretation of natural and environmental sciences, a goal which is achieved through basic research and scientific publication programs as well as all of the other functions of a natural history museum.

The museum and aquarium halls were visited by 1,312,198 people during the year. Of these 600,883 were adults and 150,865 were children who paid admission fees of \$337,865, 560,450 had free admission, including 18,041 members and 63,922 guests on free admission days, 224,479 children under 12 and 27,357 adults over 65, and 226,651 students and others who came in organized groups.

HIGHLIGHTS

Monthly members' meetings became so popular three sessions were scheduled for each one, and five were arranged for David Cavagnaro's lectures. Members' trips went to

Baja California and the Galápagos Islands and many less exotic places. Academy scientists worked in Africa and around the world. The Steinhart Divers collected fish for the aquarium in the Gulf of California and Hawaii.

A one-hour film about Baja California was produced by the Academy for television and theater projection, and the Academy was otherwise represented in conservation efforts in the United States, Mexico, the Galápagos Islands, and Africa. Three books in the "Animal Life of North America" series of Doubleday Company were written by Academy scientists Earl S. Herald, Alan E. Leviton and Robert T. Orr.

Dr. George S. Meyers was awarded the Academy's Fellows' Medal "in recognition of his outstanding contributions to the science of biogeography, herpetology and ichthyology." Several research grants were received from the National Science Foundation to support investigations by Academy scientists, and two departments received NSF funds to help with the curatorial maintenance expenses of their research collections.

The 1971-72 fiscal year was one of progress and one of decision. The Board of Trustees employed the firm of Milton T. Pflueger, Architect, to prepare a master plan for

the improvement of the Academy buildings to better service the public visitors and improve the efficiency of the research and service areas.

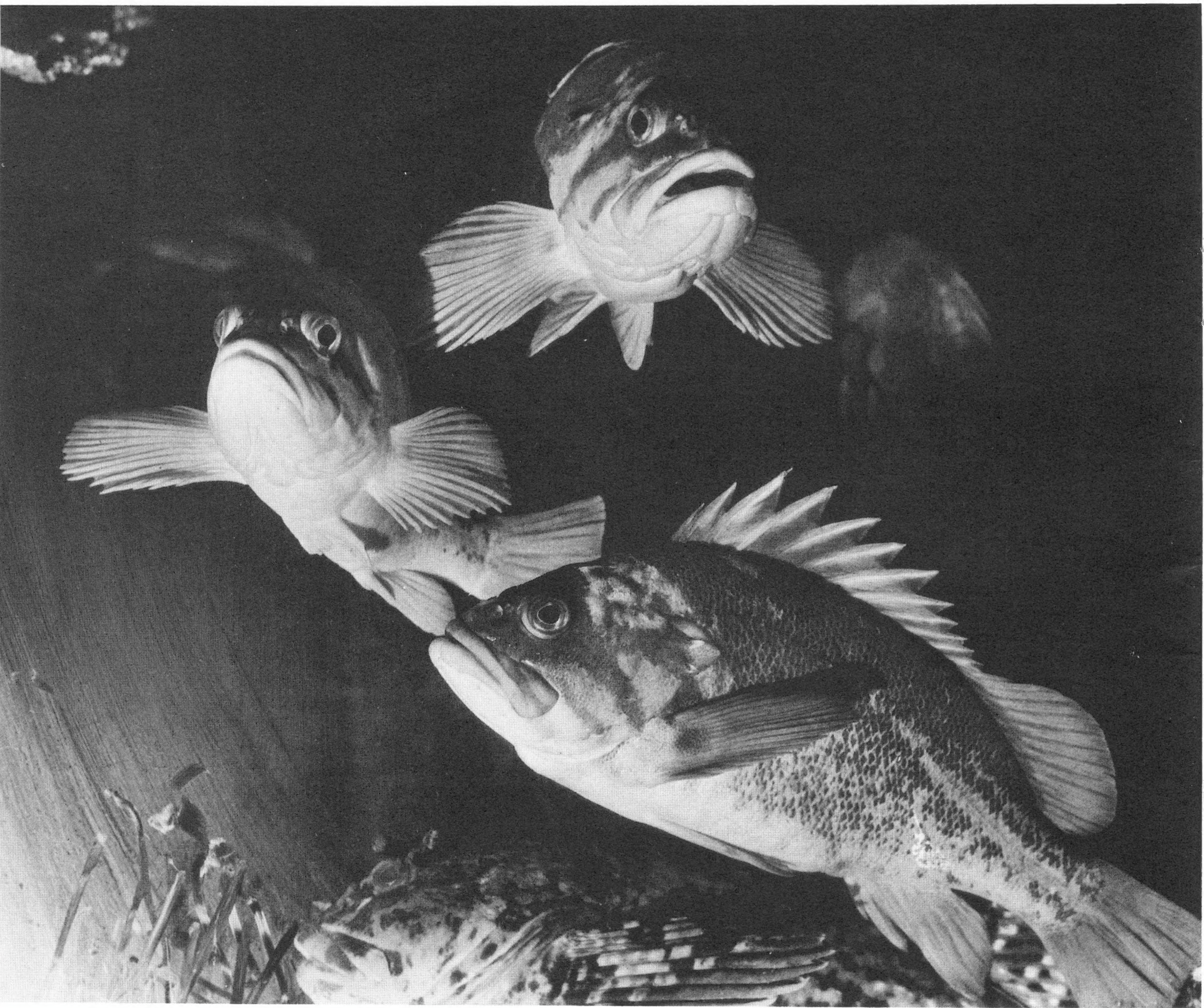
STEINHART AQUARIUM

Earl S. Herald, Associate Director and Chairman. The beauty and diversity of the living exhibits in Steinhart Aquarium make it the most popular of the Academy's public departments, and it attracts visitors from the world over. The aquarium is also the focal point of an organization of enthusiastic supporters called the Steinhart Divers, as well as the San Francisco Aquarium Society and other aquatic-oriented groups.

The aquarium accessioned 17,127 animals during the year, of which 3,136 were purchased, 5,359 were gifts, and 8,428 were collected, while another 204 were received through exchange. The Steinhart Divers made two productive collecting trips in the Gulf of California and one to Hawaii, and the Research Vessel *Searcher* of the Janss Foundation of Los Angeles took Dr. Herald and Lloyd Gomez on two cruises to the Revillagigedo Islands, returning with tanks filled with rare specimens for Steinhart. Herpetologist Karl Switak spent ten weeks on an around-the-world trip to study and collect reptiles, particularly those of New Guinea, in addition to his field studies of the reptiles of the southwestern United States and northern Mexico. Glenn Burghardt and Lloyd Gomez studied aquaria and chitons in Japan. Many short local collecting trips were



Above, a geophysical and oceanographic relief world globe was given to the Academy by the Bank of America in October 1971. Mr. Samuel Stewart, Senior Vice Chairman of the Board of the Bank of America, right, presented the globe to Academy Trustee Mrs. Austin Morris and Director George Lindsay. Left, Academy members' field trips explored distant areas, including the Galápagos Islands, Guatemala, and Baja California.



made by W. Walter Schneebeli and other aquarium personnel.

The aquarium is the largest department of the Academy, and its operation requires the twenty-four hour attention of a staff of engineers and highly-trained biologists and aquarists. It receives substantial support from the City and County of San Francisco, as provided by the City Charter.

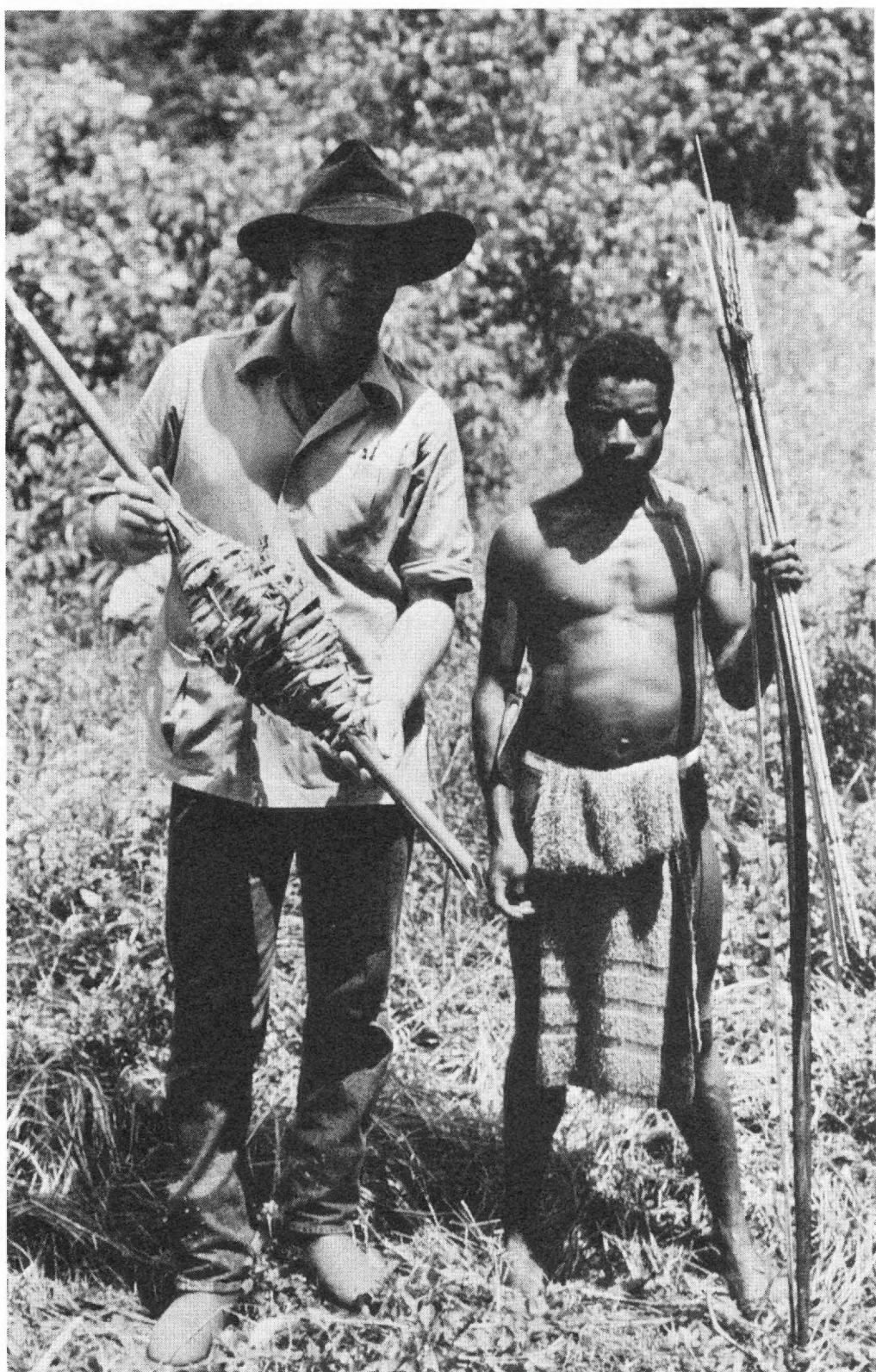
MORRISON PLANETARIUM

Captain Robert D. Risser, U.S.N. (Ret.), Supervisor. There were 944 performances of seven public shows during the year, attended by 138,704 people, and 140 student performances which were attended by 37,833, for a total of 1,084 performances which were viewed by 176,537 people.

In addition 185 persons took the courses offered in celestial navigation and there were 107 students in the astronomy classes. As usual the planetarium showed a substantial profit which went into the general operating income for the Academy.

Morrison Planetarium was dedicated November 6, 1952, and in the years since then more than three and one half million people have come to the nearly twenty thousand programs which have been presented. Approximately one million were school children who attended in class groups, to learn about the universe. Certainly all were impressed by the realism of Morrison Planetarium's simulated sky, produced by a complicated projector manufactured by the staff in the Academy's instrument shop twenty years ago.

Right, Academy employees Dennis Breedlove, Tsiak Tsapat, and Hantun Osil discuss a plant in connection with the Flora of Chiapas project. Below, Karl Switak, Supervising Herpetologist of Steinhart Aquarium, had the help of this man of the Kubin Clan while exploring the Jimi Region of the Western Highlands District of New Guinea.



INSTRUMENT SHOP

Steven B. Craig, Superintendent. The Instrument Shop makes special effects projectors and instruments for the planetarium and special equipment for the Exhibits Department and other departments. Two Foucault pendulums were manufactured for other institutions during the year, one for Cheyney College in Pennsylvania and the other for Khonkaen University in Thailand.

Shop personnel also do the electrical work for all Academy departments, operate the print shop, and maintain much of the equipment, including electronic amplification systems, locks and security, and technical instruments.

JUNIOR ACADEMY

Kenneth E. Lucas, Supervisor. The California Junior Academy of Sciences is a center for young people with keen interests in science. It provides opportunity for them to learn, and for the more serious and able of the junior members it serves as a bridge to the research personnel and departments of the parent Academy. There were 519 Junior Academy members in 1972, and 435 were enrolled in the summer program which offered twenty courses dealing with natural and physical sciences. Academy scientists assisted Mr. Lucas and the Junior Academy staff members by teaching and leading field trips, and the staff included student instructors and assistants who were also essential to the program. There were numerous single-day and longer field trips.

A two-year renovation program of the Junior Academy, which was sponsored by a grant from the San Francisco Foundation, was completed. The grant included funds for a field vehicle, microscopes, and other laboratory and teaching equipment which have added greatly to the efficiency and appearance of the department.

DOCENT COUNCIL

Mrs. Roland Perkins, Chairman and Mrs. Rex Butler, Secretary-Coordinator. The Docent Council, comprised of 76 active volunteers, conducted tours for 8,632 students and

other visitors. School groups came from 61 California cities in 16 counties, from Humboldt in the north to Merced in the south. A new In-School Program, under the leadership of Mrs. John Steinberg, provided classroom visits to San Francisco schools.

The Docent Council sponsored a "Fish Fair" fund-raising event, chaired by Mrs. James Mailliard, which was attended by 1,400 persons.

The basic training course for docents was repeated, under the chairmanship of Mrs. Dario Ghiorso and supervision of Dr. Robert T. Orr. Advanced training courses for African Hall and Steinhart Aquarium were under the chairmanship of Mrs. Hilda McAvin and supervision of Dr. Orr and Dr. Earl S. Herald.

Mrs. Willard Norberg arranged field trips to the Hopkins Marine Station, Sacramento National Wildlife Refuge, Ano Nuevo Island, and the Monterey Bay tide pools. Mrs. Robert Solomon edited the Docent Council's monthly publication *TOURisms*.

The activities of the Docent Council have added a new dimension to the Academy's interpretive programs.

J. W. MAILLIARD, JR., LIBRARY

Ray Brian, Librarian. A library is an essential department of any research organization. The Academy's Mailliard Library is an important source for Academy personnel and members and for a broader community of users. Its holdings in systematic biology place it among the largest in northern California and as a result there are heavy demands from student and professional biologists with other institutions—there were 417 requests for inter-library loans, for example, while we asked to borrow 97 references from



Public educational activities included the Bay Area Science Fair, field trips for members of the Junior Academy, and lectures in Alexander F. Morrison Planetarium.



24 other institutions.

The library spent \$8,503.03 for book purchases and \$6,905.13 for serials and monographs during this report period. It additionally received publications from 478 foreign and 141 domestic institutions with which the Academy maintains exchange agreements.

Each of the Academy's departments has a specialized library of its own subject material, which is serviced by the central library.

The five Mailliard Library employees receive very substantial help from a cadre of regular volunteers and several work-study students from the University of California, California State University at San Francisco, and the University of San Francisco.

PICTURE COLLECTION

Johan Kooy, Chairman. The Picture Collection is the Academy's treasure house of rare images. The illustrations of its past and present are safeguarded there, ready for prompt retrieval and use, as are thousands more of natural history subjects.

Many important gifts were received during the year. Mr. and Mrs. S. D. Bechtel, Jr., gave a number of botanical prints by Henry Evans, Mr. William C. Jacobsen gave five watercolor paintings by Louis Agassiz Fuertes, and Mary Virginia Roberts contributed a fine collection of her plant paintings. Photographs are the lifeblood of a picture library, and among the fine new collections which came are the birds of Margaret Gregory; the African wildlife of A. J. Emmerich; and general nature photographs by Mr. and Mrs. Robert Potts. Mr. and Mrs. J. McClellan continue to add to our holdings of their exquisite botanical photographs as

have other generous donors. Moss Photography Company donated thousands of negatives of historic Academy photographs. Most important financial support of the Picture Collection came from Mr. Paul H. Anderson, Miss Muriel T. French and Mrs. Helen Peterson.

Nineteen volunteers make possible the accessioning, filing, and loan of thousands of prints and photographs each year. Mr. Anderson, Miss French, Mrs. Cecil Iden, and Mr. Fred Dodds and all others gave generously and selflessly.

PACIFIC DISCOVERY

Bruce Finson, Editor. The Academy's journal of nature and man in the Pacific world appears six times each year, in issues of more than 10,000 each. They carry articles about ecology and general natural history and anthropology—and frequently tell of Academy expeditions or research projects in reports by the participating staff members. The magazine is in its twenty-fifth year, and while it is modest in format, its quality and its popularity are high.

Johan Kooy is Art Director, George Lindsay is Managing Editor, and Robert I. Bowman, Robert C. Miller and Robert T. Orr are Associate Editors.

EXHIBITS

Ernest R. Rook, Chairman and Curator. Exhibits are the essential feature of a museum, and the Academy has diverse kinds—living things in the aquarium, images and demonstrations in the planetarium, and objects in the museum halls. Mr. Rook and his department have responsibility for the museum displays and special exhibitions.

The most conspicuous new exhibit was a geophysical



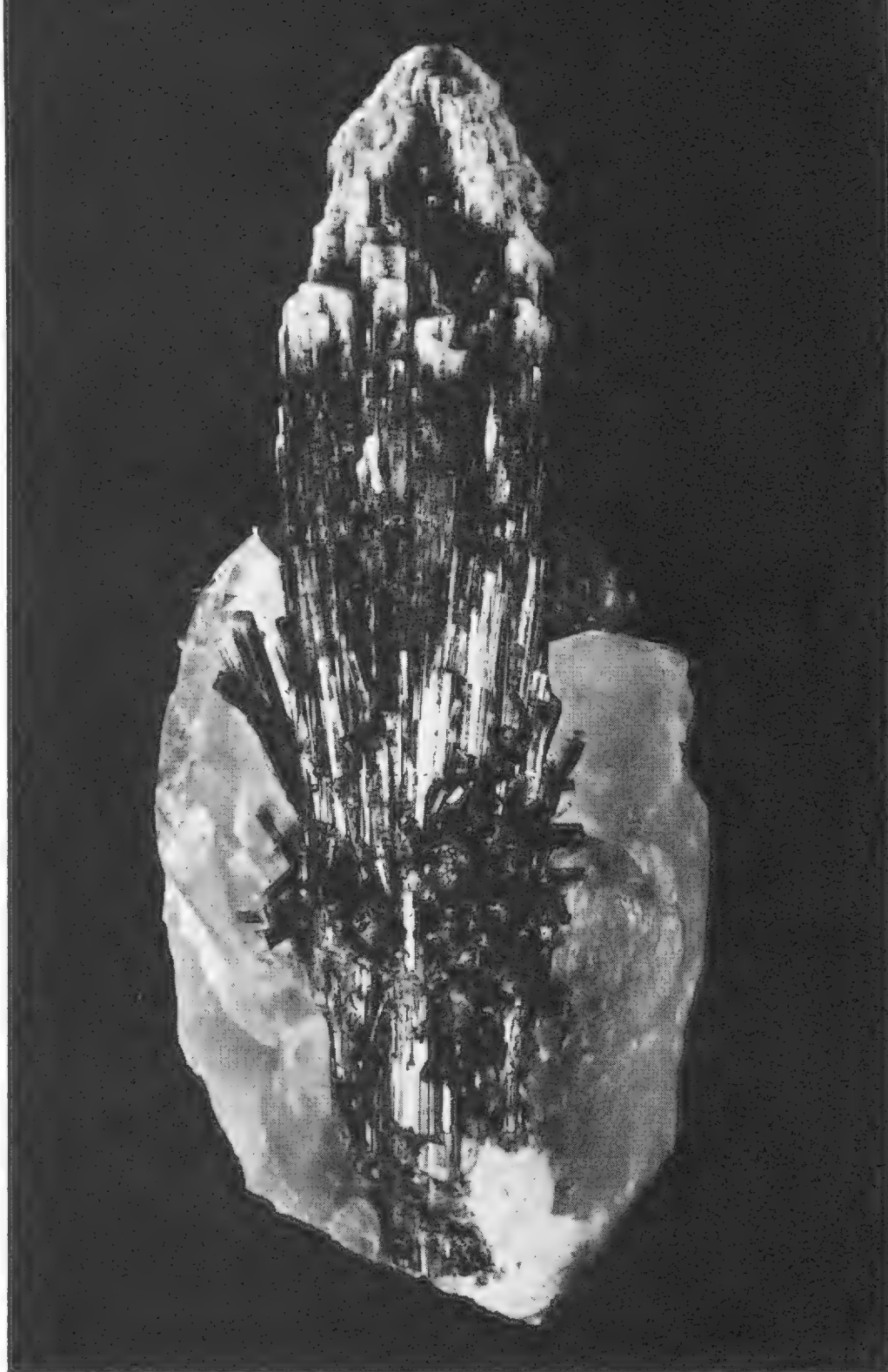
and oceanographic relief world globe which was revealed to the membership on October 6, 1971. A gift of \$25,000 from the Bank of America made its purchase and installation possible. It is said to be the most accurate representation of the earth and it is the finest and most contemporary of globes.

There were additions to the mineral exhibits and plans were developed for a major expansion of those displays. Mr. and Mrs. Lewis K. Land gave many valuable specimens, including a 60.6 carat tanzanite crystal for display with the 39.55 carat faceted tanzanite stone which was earlier donated by Tiffany and Company. The two gems are appraised in excess of \$5,000 each.

A temporary ecological exhibit, "Man and Nature," featured the Indians of North America and their use of natural materials at a time when man existed without destroying his environment.

Temporary shows included "Pygmy Forest," "Bristlecone Pines," "Natural Parks," "Nature Abstractions," "Edge of a Continent," and "Baja California."

Right, a magnificent tourmaline crystal from Brazil was one of the many important exhibit mineral specimens presented to the Academy by Mr. and Mrs. L. K. Land. Below, a new exhibit of North American bears included a black bear from Yellowstone Park, donated by the National Park Service, a brown bear from Alaska collected by Belmore Brown and donated by the late Norman Livermore, a polar bear from Alaska collected and donated by David B. Bohannon, and a glacier bear (a blue-gray color phase of the black bear) collected and donated by Jean McCaughey.



PUBLIC INFORMATION

Hal Richardson, Public Information Officer. The media—press, radio, television—continues to be generous in broadcasting news of the Academy and its activities. Mr. Richardson provides information to the media, and to freelance writers who come for assistance on special features. He is author of the monthly *Newsletter* and writes an occasional "Academically Speaking" column for *Pacific Discovery*. He is also in charge of the programs for the monthly members' meetings.

Two volunteer assistants, Mrs. Walther Buchen and Mrs. Grace Curtis, give generously of their time in maintaining the annual press books.

DEVELOPMENT AND MEMBERSHIP

Mrs. Kathleen F. Bowman, Development Officer. Mrs. Bowman was appointed Development Officer following the death of Mr. Raymond L. Finehout, Director of Development, in early March, 1972. The Development Office conducts continuing programs for corporate, foundation and individual support which are essential for the operation of the Academy, and provides staff assistance for the Trustee committees which oversee these activities.

Mrs. Austin Morris was chairman of the membership committee of the Board of Trustees, which directed a recruitment program for new members and the special mem-

bers' travel program. On July 1, 1970 there were 4,647 Academy and 322 Junior Academy members; on July 1, 1971 these had increased to 5,838 adult and 430 junior members; and on July 1, 1972 there were 6,695 adult and 514 junior members.

Seven field trips for members, each guided by Academy scientists, went to Mt. Lassen, South America and the Galápagos Islands, Baja California, Mt. Diablo, Moss Beach, the Farallon Islands, and Santa Barbara and Anacapa Island. Seminar series were given for Baja California and Africa.

RESEARCH ACTIVITIES

Systematic research in the life sciences and publication of the results of that research were original purposes of the California Academy of Sciences, and have remained its principal objectives for more than a century. Systematic research provides the knowledge about the kinds of creatures in our world which is fundamental to understanding the complex pattern of nature. Without such understanding man may not survive.

The great systematic biology collections are national information resources. They are tremendous files of indispensable data which have resulted from the work of many generations of scientists. For example, the Academy's insect collections contain 5,827,000 fully-processed specimens. These represent the life work of many specialists, and they are preserved and used by scientists from all over the world. Many came here, and 99,685 specimens were loaned in 297 separate transactions to 172 persons at 85 different institutions during this report year. Without our Academy collections, essential research by our scientists would have been hampered, and systematic entomological research in general would have suffered.

Field exploration for new information remains a prime activity of natural history museums. As will be noted in the following departmental reports, Academy scientists traveled far on their trips of discovery, returning with new ideas and new things.

BOTANY

Elizabeth McClintock, Acting Chairman and Curator. On June 1, 1972 there were 557,000 mounted plant specimens in the herbarium of the California Academy of Sciences, including 12,000 which were accessioned during the year.

Assistant Curator Dr. Dennis Breedlove commenced an ambitious and exciting project, the preparation of a flora of the southern Mexican State of Chiapas. Moving with his family to the highland town of San Cristobal de las Casas in September 1971, Dr. Breedlove established a secondary station in Ocozocoautla de Espinosa in the lowlands, and began general collecting which produced more than 20,000 specimens. The project has substantial support from the National Science Foundation and will require several years to complete. There is an urgency in this botanical survey because the unique tropical cloud forests in Chiapas, as well as other regions, are disappearing before they can be studied.

Before going to Chiapas Dr. Breedlove participated

in an interdisciplinary project on plant-animal co-evolution which was coordinated by Dr. Paul R. Ehrlich of Stanford University.

Dr. McClintock worked on the ornamental plant flora of Chiapas and continued research on other ornamental plant projects. Dr. John H. Thomas divided his time under a joint appointment with Stanford University, his Academy efforts being primarily curatorial. Curator Emeritus John Thomas Howell worked on the flora of the Sierra Nevada, and in collaboration with Mr. Vernal Yadon and Miss Beatrice Howitt completed a supplement to the published flora of Monterey County. Research Associate Gordon True continued studies of the flora of Nevada County.

ENTOMOLOGY

Paul H. Arnaud, Jr., Chairman and Curator. As was mentioned in the general discussion of research activities, the insect collection has 5,827,000 specimens, 127,802 having been accessioned during the year from gifts and expeditions. The largest gift received was 49,332 specimens from the late Edwin R. Leach. It included specialized collections of the Cetoniid and Lucanid beetles of the world. Other large collections received as gifts included 5,621 miscellaneous insects from Mr. Derham Giuliani; 5,472 insects, mostly Diptera, from Mr. Jack R. Powers; 5,050 California insects from Mr. Peter Rubtzoff; 4,042 insects from the United States and Mexico from Mr. M. Charles Cushner; and 3,293 insects, mostly Hymenoptera, collected in the western United States by Dr. Andrew R. Moldenke. Many smaller gifts were also very important, because they contained rare or particularly significant specimens. One hundred fifty-six individuals or institutions deposited insects at the Academy this year.

Dr. Arnaud completed a 1,544-page manuscript of a "Host Catalog of North American Tachinidae" under a contract between the Academy and the U.S. Department of Agriculture. The family Tachinidae includes parasitic insects of enormous importance in the biological control of insect pests. Dr. Edward S. Ross was in Africa on a photography and Embioptera collecting safari for six months during which he drove from Capetown in South Africa to Nairobi, Kenya, in East Africa. Dr. Stanley C. Williams continued his studies of the scorpions of Baja California with support from the National Science Foundation. Mr. Herman G. Real spent one month in the Cape region of Baja California as a Patterson Fellow, in connection with a study of the peninsular butterflies. Mr. Hugh B. Leech confined his collecting to California this year.

The National Science Foundation, in recognition of the services provided by the Entomology Department to the whole scientific community, made a grant of \$42,800 to help with the expense of curating the collection during the coming year, and indicated this would probably be continued for at least five years. The department loaned 99,685 specimens during the fiscal year, in 297 separate transactions, to 172 persons at 85 institutions, and to 22 private individuals. Most of the specimens were loaned within the United States, and graduate students were heavy borrowers.

GEOLOGY

Peter U. Rodda, Chairman and Curator. On January 15, 1972 Dr. Leo G. Hertlein, Curator Emeritus, died at the age of 73. He was a member of the Academy staff from 1925 until his retirement in 1970.

The invertebrate paleontological and Recent shell collections were increased by 5,562 lots during the year, for a total of 50,500 lots or suites of specimens. The geology type collections had 82 accessions, for a total of 13,769 specimens. Particularly noteworthy was the holotype of a new species of mollusk, *Conus fletcheri*, from the Taiwan Straits, donated by Mr. George Mendenhall. More than 1,000 specimens were added to the mineral collections, which now have 8,400 specimens. Especially valuable additions were given by Mr. and Mrs. L. K. Land, Mrs. Herman Budelman, Mr. Edward Swoboda, Mr. Jerry Wentling, Mr. and Mrs. William Larson, Miss Josephine Scripps, and Mr. and Mrs. John W. Hilton.

The Geology Department includes several disciplines: invertebrate paleontology, micropaleontology, stratigraphy and mineralogy. Dr. Rodda is working on the biostratigraphy and systematics of California Cretaceous Mollusca and Mrs. Jean B. Durham on the Lower Cambrian fossils from eastern California and on the Upper Miocene stratigraphy of the Bay Area. Mr. Barbat continued work on his book on the geology of California, and Dr. Fletcher worked on a comprehensive systematic catalog of the shells of living *Cypraea*. Mr. Charles W. Chesterman supervised the mineral collections and exhibits, with Mr. David Cerkel.

In November 1971 the G Dallas and Margaret Hanna Trust made a gift of \$5,000 to the Department of Geology to establish a "Hanna Geology Publication Fund."

HERPETOLOGY

Alan E. Leviton, Chairman and Curator. Accessions numbered 4,766 specimens during the year, and the collections totaled slightly more than 220,000 specimens on June 30, 1972, but a backlog of Philippine, New Guinean, Mexican, Iranian, and Arabian reptiles and amphibians remains to be accessioned and cataloged.

During the summer of 1971 Mr. Robert C. Drewes conducted a herpetological expedition to northern Kenya on which more than 2,000 specimens were collected. Mr. Ted Papenfuss continued his studies in the Sahara, but also began research on the Mexican two-legged lizards of the genus *Bipes*. Dr. Walter C. Brown and Dr. Angel Alcala continued investigations on the structure of the amphibian and lizard populations in tropical habitats in the Philippine Islands, with support of the National Science Foundation. Dr. Malcolm Miller pursued his studies on the nerve pathways of the inner ear in lizards.

Dr. Leviton and E. M. Arnold of the British Museum are revising the sand skinks of the genus *Scincus* of the Arabian Peninsula, and Dr. Leviton and other workers are reviewing the snakes of Iran and the South American hemiphract frogs. Dr. Leviton's book "Reptiles and Amphibians of North America" was published by Doubleday and Company, New York, in 1971.

ICHTHYOLOGY

William N. Eschmeyer, Chairman and Associate Curator. The transfer of the Stanford University fish collection and its merger with the Academy collection was completed during the year. There are some 167,000 lots of specimens in the combined collection, which ranks among the most significant in the world. The Stanford collection transfer was financed by a \$25,000 grant from the National Science Foundation. The National Science Foundation provided a grant of \$34,700 to help pay for the maintenance of the collection for one year, and has indicated that support will be continued, as justified by the use of the collection by the scientific community.

Dr. Tomio Iwamoto joined the staff as Assistant Curator with one-half his salary supported by the NSF grant, which also paid the salaries of two new curatorial assistants and one research assistant. The Federal support is to supplement, and not substitute for, the normal Academy budget for the department.

Dr. Eschmeyer completed a National Science Foundation sponsored project "Systematics of scorpaenid fishes" and undertook, with Dr. Lo-chai Chen, a new NSF-supported project "Study of the systematics, evolution and biology of the scorpionfish subfamily Sebastinae with emphasis on the genus *Sebastes*."

Dr. Warren C. Freihofer continued his studies on the nerves of fishes, particularly with regard to higher-category classification of fishes; these studies are supported in part by a National Science Foundation grant.

Mrs. Lillian Dempster worked with Dr. Eschmeyer on a catalog of scorpionfishes and with Mr. Follett and Research Associate Dr. Carl L. Hubbs on their extensive list of California fishes.

Mrs. Pearl Sonoda supervised the loan services and the assistants. About 4,700 specimens were sent to fifty ichthyologists and graduate students. Eighty scientists or graduate students came to the Academy to work on the collections, some for extended periods.

INVERTEBRATE ZOOLOGY

Allyn G. Smith, Chairman and Associate Curator. Mr. Smith, who had been chairman of the department since its activation July 1, 1960, retired June 30, 1972. He is to be congratulated for his accomplishment in assembling a major research collection during those twelve years, particularly in view of his small staff and limited budget.

The wet-preserved invertebrate collection is one of two in western North America, and the opisthobranch (nudibranches and related forms) assemblage is probably the largest in the United States, as is that of wet-preserved molluscs. The chiton and barnacle collections are also two of the most important in the United States.

The Hopkins Marine Station (Stanford University) collection of more than 5,000 lots was acquired in early 1972. It includes Steinbeck and Ricketts, David Starr Jordan, and other historically interesting and scientifically important materials. Additional significant collections were received from the Department of Fish and Game, David

Harden, Franz Steiner, Armand Kuris, and others.

Mr. Smith's primary research interest was in the classification of chitons, and he will continue his research as a Research Associate in the Department of Geology.

Requests for identification of organisms took an increasing amount of staff time, and these can only increase as more agencies become involved with environmental impact studies and reports. Also, the collections remain as a primary resource for pre-industrial analysis of heavy metal and insecticide absorption by invertebrates. One such loan, of mussels collected in South San Francisco Bay in 1903, was made to the Pesticides Analysis Investigations Branch of the California Department of Fish and Game. Decade-by-decade collections of commercial shrimp from San Francisco Bay (since 1912) lend themselves to similar analyses.

The Invertebrate Zoology Department is not yet adequately staffed to meet its obligations and supply the services requested of it. A cadre of able volunteers continues to provide essential help and support, but the professional staff must be increased in order for the department to achieve its potential.

Academy scientists wrote popular books on natural history, as well as scientific research papers. At the right are three books that were published during the year. Below, open house night for members attracted more than 1500 visitors who saw samples from the millions of specimens held in the research collections.

ORNITHOLOGY AND MAMMALOLOGY

Robert T. Orr, Chairman and Curator. Sixty-nine mammals, including a Minke whale, were added to the collection, as were 97 birds, to increase the holdings to 20,469 mammals and 82,197 birds.

Dr. Orr is Associate Director of the Academy and most of his time was devoted to that responsibility. He was



active in the docent program and led members' trips to the Galápagos, Baja California, Santa Barbara, Mt. Diablo, and the Farallon Islands. He organized public seminars and gave numerous lectures. He was on the Advisory Board of the Charles Darwin Foundation for the Galápagos Islands, Permanent Director of the American Society of Mammalogists, and Council Member of the Cooper Ornithological Society. In May he was appointed to the Condor Advisory Committee of the U.S. Forest Service, and in June was elected Secretary of the Pacific Division of the American Association for the Advancement of Science. Dr. Orr also heads an Academy group which is investigating the biology of the Delta-Mendota Canal under a contract with the Bureau of Reclamation of the Department of the Interior.

Two books by Dr. Orr were published during the year, "Mammals of North America" and "Birds of the Lake Tahoe Region" which he co-authored with the late James Moffitt.

Assistant Curator Laurence C. Binford was responsible for the direct supervision of the department and during the year completed the remodeling of the annex storeroom, continued organization of the Stanford bird collection, and supervised the work of Senior Scientific Assistant Jacqueline Schonewald and Curatorial Assistant Lise Thomsen who identified, accessioned, prepared, and cataloged incoming bird and mammal specimens. Many of the identifications were for government agencies responsible for enforcement of Federal regulations concerning endangered species. Dr. Binford joined Dr. Dennis Breedlove on a research expedition into the mountains of Oaxaca and Chiapas from April 23 to May 13, continuing studies of the avifauna of Oaxaca. Dr. Binford is President of the Board of Directors of the Point Reyes Bird Observatory and holds offices in various other scientific societies.

Charlotte Dorsey became full-time secretary on July 1, 1971, and also took care of the reprint collection and Moffitt Library.

SCIENTIFIC PUBLICATIONS

Edward L. Kessel, Editor, and Diana Young, Assistant Editor. The Academy issued 1,108 pages of scientific publications during the year, 176 pages of *Proceedings*, 356 pages of *Occasional Papers*, and 576 pages of special publications.

"Birds of the Lake Tahoe Region," a 150-page book by Robert T. Orr and James Moffitt, was published by the Academy in late 1971. "Echeveria," a 426-page book about a genus of succulent plants by Eric Walther, was completed early in 1972. The latter book contains 16 pages of color plates and 226 illustrations by the author, Reid Moran, and other contributors. The printing and binding of "Echeveria" were made possible by a bequest for that purpose from Eric Walther. The attractive book was designed by Adrian Wilson and printed by George Waters Photolithography.

STUDENT ASSISTANCE PROGRAM

Forty-five students were employed at the Academy on a part-time basis under contracts with California State University at San Francisco, the University of San Francisco, and the University of California at Berkeley under the E.O.A. work-study program of the U.S. Department of Health, Education and Welfare. The Academy provided \$9,665 of the \$37,314 wages the students earned. Every research department participated and 15,200 hours were worked, equivalent to 8.3 full-time positions. Dr. Alan Leviton was in charge of the work-study program, which was for students who otherwise might not have been able to attend college.

George E. Lindsay

GEORGE E. LINDSAY
Director



ACADEMY VOLUNTEERS

During the year many of the Academy's activities were augmented by volunteers who generously donated their time and services. Some assisted in the various departments: typing, cataloging, and performing other necessary tasks, while others served as docents after completing the docent training courses. We are most grateful to the following:

Mrs. Merritt Adelman, Docents	Mrs. Eugene Hammond, Docents	Miss Sybil Renee McGowan, Docents
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NOTES

EOA—*Economic Opportunity Act. Work-study student sponsored by the Federal Government Health, Education and Welfare Department through the University of California, Berkeley, California State University at San Francisco, or the University of San Francisco.*

NSF—*National Science Foundation sponsored.*

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CALIFORNIA ACADEMY OF SCIENCES
BALANCE SHEETS—JUNE 30, 1972

ASSETS							
	Current funds		Unexpended plant improvements	Building fund	Special purposes	Endowment funds and funds functioning as endowment	
	General operating	Restricted to research					
Cash:							
Commercial accounts	\$ 564	\$ 29,452	\$ 809	\$ —	\$ 24,276	\$ 285	
Savings accounts	—	—	15,924	—	25,860	2,377	
	564	29,452	16,733	—	50,136	2,662	
Receivables:							
Research grants (note 2)	—	155,286	—	—	—	—	
City and County of San Francisco	13,410	—	—	—	—	—	
Other	9,089	—	153	3,193	7,321	18,462	
	22,499	155,286	153	3,193	7,321	18,462	
Inventories (at lower of cost (first-in, first-out), or market)	23,611	—	—	—	—	—	
Prepaid expenses	10,024	—	—	—	—	—	
Investments (at cost) (note 3):							
Commercial Property, including a fully depreciated building (appraised value \$1.5 million)	—	—	—	—	—	608,084	
Marketable securities (market value \$2,958,274)	—	—	15,373	100,348	733,907	1,991,814	
	—	—	15,373	100,348	733,907	2,599,898	
Due from other funds	—	11,111	—	—	—	12,680	
Buildings (note 4)	—	—	—	—	—	—	
Collections, library and equipment (note 5)	—	—	—	—	—	—	
Unamortized lease commissions (amortized on the straight-line basis over 40 years)	8,354	—	—	—	—	—	
	8,354	11,111	—	—	—	12,680	
Total assets	\$65,052	\$195,849	\$32,259	\$103,541	\$791,364	\$2,633,702	
LIABILITIES AND FUND BALANCES							
Note payable to bank, 5% due 9-16-72 with securities pledged as collateral	—	—	—	—	—	210,000	
Accounts payable	22,365	—	—	—	1,925	—	
Accrued expenses	7,882	—	—	—	—	—	
Due to other funds	11,111	—	1,080	—	11,600	—	
	41,358	—	1,080	—	13,525	210,000	
Fund balances	23,694	195,849	31,179	103,541	777,839	2,423,702	
Total liabilities and fund balances	\$65,052	\$195,849	\$32,259	\$103,541	\$791,364	\$2,633,702	

See accompanying notes to financial statements.

CALIFORNIA ACADEMY OF SCIENCES
SUMMARY OF FINANCIAL ACTIVITIES
YEAR ENDED JUNE 30, 1972 WITH COMPARATIVE FIGURES FOR 1971

Support from the public:	1972	1971
Corporate contributions	\$ 44,280	\$ 48,352
Individuals, trusts and private foundations	331,876	304,870
Total support from the public	<u>376,156</u>	<u>353,222</u>
Operating income:		
From the City and County of San Francisco for		
support of operations	624,374	597,479
Fees and grants from others	203,974	92,560
Membership dues	92,491	80,515
Planetarium	126,153	128,237
Admissions	337,865	370,049
Sales of merchandise	152,973	140,825
Restaurant royalty	54,234	53,266
Other	123,263	94,438
Total operating income	<u>1,715,327</u>	<u>1,557,369</u>
Investment income:		
Rent from commercial building	136,572	125,197
Interest and dividends	128,645	120,371
	<u>265,217</u>	<u>245,568</u>
Total revenue	<u>2,356,700</u>	<u>2,156,159</u>
Deduct revenue limited by donors:		
Endowments	83,650	68,004
Currently expendable for research as specified by donor ..	273,132	187,714
Plant and equipment additions	101,657	1,038
Special activities	117,681	154,859
Total revenue limited by donors	<u>576,120</u>	<u>411,615</u>
Amount available to finance current operations.	<u>1,780,580</u>	<u>1,744,544</u>
Expenditures:		
Aquarium and museum	739,040	736,335
Departmental research and curatorial activity	567,962	518,422
Planetarium	75,998	80,803
General and administrative	425,537	387,866
Cost of merchandise sales	141,321	131,761
Plant and equipment additions	2,117	—
Special purpose activities	75,756	94,721
Employees' pension annuity (note 6)	34,410	28,444
Interest	11,604	15,152
Other	11,972	15,797
Total expenditures	<u>2,085,717</u>	<u>2,009,301</u>
Deduct expenditures financed by special funds:		
Endowment—unrestricted	11,972	11,211
Restricted to research	174,780	178,193
Restricted to plant improvements	2,117	42
Restricted to special purposes	75,756	99,265
	<u>264,625</u>	<u>288,711</u>
Expenditures financed by current		
general revenue	<u>1,821,092</u>	<u>1,720,590</u>
Excess (deficit) of current operating		
revenue over related expenditures	<u>\$ (40,512)</u>	<u>\$ 23,954</u>

See accompanying notes to financial statements.

CALIFORNIA ACADEMY OF SCIENCES
STATEMENT OF CHANGES IN FUND BALANCES
YEAR ENDED JUNE 30, 1972

	Current funds		Unexpended	Building	Special	Endowment funds and
	General	Restricted	plant	fund	purposes	as endowment
	operating	to research	improvements			
Balance at beginning of year:						
As previously reported		\$ 91,793	\$31,604	\$ —	\$738,061	\$2,259,095
Adjustments (note 1)		5,704	—	—	7,148	22,016
As restated	36,456	97,497	31,604	—	745,209	2,281,111
Additions:						
Current revenue, expendable for research as specified by donor	—	273,132	—	—	—	—
Contributions, grants and appropriations for endowments and special purposes	—	—	—	100,526	36,449	83,650
Investment income, gains and losses	—	—	1,692	3,015	55,630	70,913
Other	—	—	—	—	44,057	—
Total additions	—	273,132	1,692	103,541	136,136	154,563
Deductions:						
Excess of current operating expenditures over related revenues	40,512	—	—	—	—	—
To finance expenditures of current funds	—	162,176	—	—	—	—
Indirect costs recovered on research grants	—	12,604	—	—	—	—
Amounts expended for furniture and fixtures	—	—	2,117	—	—	—
Other	—	—	—	—	75,756	11,972
Total deductions	40,512	174,780	2,117	—	75,756	11,972
Transfers between funds	27,750	—	—	—	(27,750)	—
Balance at end of year	\$23,694	\$195,849	\$31,179	\$103,541	\$777,839	\$2,423,702

See accompanying notes to financial statements.

ACCOUNTANTS' REPORT

The Board of Trustees
California Academy of Sciences:

We have examined the balance sheets of the funds of California Academy of Sciences as of June 30, 1972 and the related summary of financial activities and statement of changes in fund balances for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. The financial statements, prior to restatement and reclassification, for the period ended June 30, 1971 were examined by other certified public accountants.

In our opinion, the accompanying financial statements present fairly the financial position of the California Academy of Sciences at June 30, 1972 and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year except for the change which we approved, described in note 1 to the financial statements.

San Francisco, California
September 5, 1972

PEAT, MARWICK, MITCHELL & Co.
Certified Public Accountants

CALIFORNIA ACADEMY OF SCIENCES
NOTES TO FINANCIAL STATEMENTS
JUNE 30, 1972

1 — Accounting Methods

The Academy uses the accrual method of accounting with revenue being recorded when earned and expenses when incurred. The summary of financial activities for the year ended June 30, 1971, presented for comparative purposes, was examined and reported on by other certified public accountants. Certain changes in classification have been made in this statement to conform with the presentation as of June 30, 1972. Government grants are recognized in full when awarded. In prior years the Academy was on a modified accrual basis of accounting. The adjustments to the opening fund balances give effect to the change to the full accrual method of accounting. Gifts of specimens and collections which have no established value are not included in the financial statements.

2 — Research Grants Receivable

Grants receivable represent amounts pledged to the Academy for certain operations and for the completion of designated projects in future years. The grants will be collected as expenditures for the designated projects are made by the Academy. A summary of grants receivable follows:

National Science Foundation	\$144,488
Other governmental agencies	10,798
	<u>\$155,286</u>

3 — Investments

Investments are recorded at cost or, if acquired by gift, at their fair market value at the date of acquisition. A summary of the current market value of the marketable securities for each fund follows:

Unexpended plant improvements	\$ 15,533
Special purposes	\$ 742,197
Endowment (partially pledged)	\$2,099,669
Building	<u>\$ 100,875</u>

4 — Buildings

Under the terms of the Charter of the City of San Francisco, no one other than the City may hold title to buildings on City property. As the Academy facilities in Golden Gate Park were acquired, title was transferred to the City of San Francisco. The buildings, excluding Cowell Hall, were valued at \$14,126,000 by independent appraisal in 1968. Cowell Hall was completed in 1969 at a cost of \$1,545,000.

5 — Collections, Library and Equipment

Collections, library, and equipment are expensed in the year of acquisition. The Academy staff has estimated the replacement cost of collections, library, and equipment to be in excess of \$10,000,000.

6 — Employees' Pension Annuity

On January 1, 1964, the Academy adopted a pension annuity plan for all regular full-time staff members under the age of 59 as of that date.

Under the provisions of the plan the Academy and the employees each fund one-half of the pension cost. The Academy's contributions are based on 5% of the employee's salary up to \$9,000 and 7.5% of salary in excess of \$9,000. Total pension expense for the year was \$34,410. There is no past service liability and it is the Academy's policy to fund current pension costs.

7 — Living Trust

The Academy is the ultimate beneficiary under an irrevocable living trust in the amount of \$153,200 (market value \$153,487). The net income of the trust is paid to the grantors and the Academy bears the cost of all trust operations. The assets of the trust are not shown in the accompanying financial statements.

CONTRIBUTIONS

No summation of the year would be complete without acknowledgment of the support given the Academy by business organizations, private foundations and individuals, whose gifts—past and present—have made possible scientific research, curatorial activities, field expeditions, educational programs and public exhibits. A number of Academy programs are funded either directly through gifts, grants and bequests, or indirectly through income from endowment and contributed property. In terms of capital expenditures, all of the Academy's buildings have been made possible by private benefactions.

CORPORATE & FOUNDATION GIFTS

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E. D. Bullard Company
California Canadian Bank
California Cannery & Growers
California and Hawaiian Sugar Company
Chancellor Hotel
Coldwell, Banker and Company
Crocker Bank
Dancer-Fitzgerald-Sample
Del Monte Corporation
DiGiorgio Foundation
Dodge & Cox Incorporated
The Robert Dollar Co.
Dome Construction Co.
FMC Foundation
Fairmont Hotel
J. C. Fennelly Company
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First Western Bank
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Hurdman and Cranstoun, Penney & Co.
Industrial Indemnity Company
William G. Irwin Charity Foundation

Jenkel-Davidson Optical Company
Johnson & Higgins of California
Kordon Corporation
The Arthur D. Little Foundation
The Long Foundation
Lucky Stores, Inc.
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PACECO
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Pacific Gas and Electric Company
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Pacific Scientific Company
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Retail Dry Goods Association of San Francisco
Rothschild & Raffin, Inc.
Safeway Stores, Incorporated
Safety First Industries
The San Francisco Foundation
Security Pacific National Bank
Servomation Duchess, Inc.
Southwest Safety & Supply
Spreckels Sugar Company
Standard Oil Company of California
Stauffer Chemical Company Foundation
Levi Strauss & Co. Foundation
Sturges Advertising
Tenneco Chemicals, Inc., Cal/Ink Division
Thermal Power Co.
Tiffany & Co.
Title Insurance and Trust Company Foundation
Transamerica Corporation
Union Bank
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United California Bank
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As Friends of the Academy, the following individuals support the scientific and educational work of the California Academy of Sciences through annual gifts of one thousand dollars or more:

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